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NOTES ON AMERICAN RORIPPA (CRUCIFERAE)

REED C. ROLLINS

One of the most distinctive American species of *Rorippa* is *R. sinuata* (Nutt.) Hitchcock. This is because of the perennial habit and the fact that the trichomes are unusual, being somewhat vesicular and hemispherical in shape rather than elongated and pointed. On dried specimens, the trichomes appear to be flat and scale-like because they are collapsed. These are present rather sparsely along the midribs of the under sides of the leaves and on the stems on specimens from the plains states, but an increase in the abundance of trichomes and a more extensive coverage of the plants occur on material from extreme western Texas to Arizona and northward through the Rocky Mountains and to the westward in the Columbia River valley (with certain exceptions mentioned below) and in the Great Basin region. Evidently these hemispherical-shaped trichomes are not wholly persistent, for they may be seen on the young foliage and pedicels of some specimens where they are completely absent from the mature leaves and pedicels. Ordinarily, the siliques are glabrous but plants with the greatest density of trichomes have them extending to the fruits, where they may be restricted to the valve edges next to the replum or they may extend to cover the entire valve surface. A specimen from southwestern Colorado collected by T. S. Brandegee apparently impressed Gray (1876) because of the roughness produced by the dense covering of trichomes on the siliques. This specimen became the type of *Nasturtium trachycarpum* Gray. According to Kearney and Peebles (1951) only the pubescent-fruited form occurs in Arizona.

However, neither the extent nor the abundance of these peculiar vesicular trichomes is a safe basis for any taxonomic separations, and, accordingly, *N. trachycarpum* should be treated as a straight synonym of *Rorippa sinuata*.

Rorippa sinuata occurs in patches, due to the spreading of the plants by underground roots. The species appears to be adapted to disturbed soils and finds roadsides and railroad banks suitable for vigorous growth. It is not certain that it is actively increasing its geographic range but it could easily be doing so because such excellent pathways as transcontinental highways are open to it. The geographic range of *R. sinuata* appears to be from Saskatchewan and Minnesota south to Arkansas and Texas, west to Arizona and north to Washington. Munz and Keck (1959) cited it from Little Lake, Inyo County, and Modoc County, California, and these are likely areas in which to find plants of more easterly and northerly distribution. However, I have not personally seen California specimens of *R. sinuata*.

THE TYPE OF RORIPPA SINUATA

Nasturtium sinuatum was published by Torrey and Gray (1838) from Nuttall's manuscript, where "banks of the Oregon and its tributaries; also in Arkansas" are given as source localities. On the sheet bearing the type in the British Museum, two collections are present. One of these is marked "Sisymbrium sinuatum Arkansas"; the other, "Nasturtium sinuatum Columbia River & Arkansas." The specimen marked "Arkansas" and the sterile shoot on the right [one of three fragments] of the second designation resemble very closely modern material from Arkansas, Oklahoma and Texas that is regularly referred to *R. sinuata*. The other two fragments are similar to modern specimens from the Columbia River valley but, in contrast to most of the material of *R. sinuata*, they are nearly glabrous. Unfortunately, I used only a hand-lens in examining these specimens while I was at the British Museum in 1950 and I cannot now say with certainty that there are absolutely none of the characteristic vesicular trichomes present on them. In other respects, the Arkansas and Columbia River specimens appear to be similar enough to represent but a single species. How-

ever, it was disturbing to find that the Nuttall specimen in the British Museum marked "Nasturtium curvisiliqua Columbia Shores" does have a conspicuous covering of vesicular trichomes and it certainly represents the species we think of as *Rorippa sinuata*. A Nuttall collection in the Gray Herbarium marked "Nasturtium *curvisiliqua*. Sisymbrium Hooker. Oregon River", in Nuttall's handwriting, has two fragments; one is *Rorippa sinuata*, the other not determinable with certainty but definitely not *R. sinuata*. These latter must be the specimens mentioned by Torrey and Gray (l.c.) as differing from the description of *Sisymbrium curvisiliquum* Hooker. It appears to me that Nuttall either made mixed collections of *Rorippa* along the Columbia River or his collections were subsequently mixed. We know from Nuttall's own collection and from *Suksdorf 2430* near Bingen, with vesicular trichomes, and *Suksdorf 2103*, W. Klickitat County (glabrous or nearly so) that both types occur along the lower Columbia in Washington. I am satisfied that the two Suksdorf collections should be accommodated in the same species and it appears that no real difficulties will arise from accepting the Columbia River specimens on the type sheet at the British Museum as the holotype of *R. sinuata*. However, it does mean that the holotype is somewhat atypical of the species as a whole.

One source of some confusion, with regard to the typification of *Rorippa curvisiliqua*, is Torrey and Gray's (l.c.) treatment of *Nasturtium curvisiliqua* in such a way that their intent was not made clear. Nuttall was merely given credit for the transfer of *Sisymbrium curvisiliqua* Hooker to the genus *Nasturtium*. Thus, Howell (1897) assumed that *Nasturtium curvisiliqua* of Nuttall was the basionym of *Rorippa curvisiliqua* rather than the rightful *Sisymbrium curvisiliquum* of Hooker. Actually Nuttall did not intend to publish *Nasturtium curvisiliqua* as a new species and this was not done for Nuttall by Torrey and Gray.

OTHER SPECIES WITH VESICULAR TRICHOMES

One reason for a careful review of the variation and distribution of *Rorippa sinuata*, as given above, was to provide the basis for a proper assessment of specimens from Mexico

that share many technical characteristics with it, including the possession of vesicular trichomes. A critical comparison of the Mexican material with *R. sinuata* shows that the specimens do not belong to it but represent a closely related undescribed species.

Rorippa ramosa Rollins, sp. nov.

Prostrate dense perennial, up to 10 dm. in diameter; stems numerous, highly branched, sparsely pubescent with vesicular trichomes, 3-6 dm. long, branches present in the axil of nearly all leaves from base to apex of each stem; more generally pubescent than principal stems; leaves numerous, sessile, auriculate, thick, greyish-green, oblong to broadly lanceolate, pinnately lobed, 3-5 cm. long, 5-12 mm. wide, lobes confluent toward base; midrib prominent on lower surface of leaf, pubescent with vesicular trichomes; inflorescences short, mostly less than 5 cm. long; sepals oblong, glabrous or with a few trichomes present on the dorsal surface, hyaline-margined, non-saccate, 2-2.5 mm. long; petals pale yellow, spatulate, not differentiated into blade and claw, 2.5-3 mm. long, 0.75-1 mm. wide; pedicels widely spreading to ascending, straight to slightly curved outward, sparsely covered with trichomes, 3-5 mm. long, expanded at summit; siliques divaricately spreading to erect, slightly curved inward, oblong to lanceolate, plump, obtuse below, tapering above, 6-10 mm. long, valves densely covered with vesicular trichomes along their margins; styles glabrous, 1.5-2.5 mm. long; ovules numerous, funiculi slender; seeds plump, cordiform, ca. 1.5 mm. in diameter, seed coat colliculate (cf. Murley, 1951) and lustrous; cotyledons accumbent. Fig. A-C.

Herba perennis procumbens, caulibus numerosis ramosis 3-6 dm. longis; foliis crassis sessilibus auriculatis oblongis vel late lanceolatis pinnatilobatis costatis 2-3 cm. longis 4-12 mm. latis sparse pubescentibus; sepalis non-saccatis oblongis 2-2.5 mm. longis; petalis flavis spathulatis 2.5-3 mm. longis; pedicellis divaricatis vel adscendentibus sparse pubescentibus 3-5 mm. longis; siliquis oblongis vel lanceolatis ad basi obtusis 6-10 mm. longis sparse pubescentibus; stylis glabris 1.5-2.5 mm. longis; ovulis numerosis; seminibus cordiformibus colliculatis; cotyledonibus accumbentibus.

Type in the Gray Herbarium, collected in a dry arroyo, 3 miles northwest of Ceballos, Durango, Mexico, May 4, 1959, *D. S. Correll* and *I. M. Johnston 21449*. Isotype in the Lundell Herbarium of the Texas Research Foundation.

An additional collection of *Rorippa ramosa* is: San Lorenzo de Laguna, 70 miles south of Parras, Coahuila, May, 1880, *E. Palmer 34* (GH, US).

The general habit of growth of *Rorippa ramosa* is that of a densely leafy, highly ramified, flat, nearly circular plant.

FIG. A-C. *Rorippa ramosa*. FIG. A. habit sketch, × ½. FIG. B. silique × 2. FIG. C. replum showing numerous funiculi, × 2. Drawings by C. S. Tsao.

It is possible that there are basal leaves on the young plants but none are evident on the mature specimens I have studied. It is more probable that a truly basal rosette of leaves is not a characteristic of the species. The illustration, fig. 1A, even though it shows only a portion of two main stems, gives an approximate idea of the intricate branching present.

In habit alone, *R. ramosa* differs strikingly from *R. sinuata*. I have collected *R. sinuata* four times in Kansas, Colorado and Wyoming and in each instance colonies were found with the individual plants interconnected underground. Usually a single stem, or at most three or four, emerges at a given locus. In contrast to this, *R. ramosa* has numerous stems arising at the summit of what appears on the specimens to be a tap-root. An important difference between the two species is in the size of the flowers. Those of *R. sinuata* are more than twice the size of the flowers of *R. ramosa*, the petals being over twice the width. The outer sepals of *R. sinuata* are saccate while those of *R. ramosa* are non-saccate. Other differences include the shorter, more erect and stouter pedicels, more lanceolate-shaped fruits, shorter styles, less angular seeds and more prominently colliculate seed-coats of *R. ramosa* as compared with *R. sinuata*. The leafiness of the branches, relatively short infructescences and repeated branching give *R. ramosa* a distinctive overall appearance.

Rorippa ramosa is unquestionably related to *R. sinuata* from which it is geographically isolated. I have not seen any other material from Mexico that falls into this alliance within the genus.

Rorippa Walteri (Ell.) Mohr, Bull. Torr. Bot. Club 24: 23. 1897.

A photograph of the type of *Sisymbrium Walteri* Elliott in the Gray Herbarium leaves no doubt as to the application of this name to plants that have at times been placed under *Nasturtium fanacetifolium* H. and A. (cf. Schulz, 1933). The type of *S. Walteri* is in the Charleston Museum of Charleston, South Carolina. There seems little doubt that Elliott's renaming of the plants tentatively identified as

Sisymbrium tanacetifolium by Walter (1788) provides the first available name clearly applied to this species. The only justification for taking up the specific name *tanacetifolium* would be to consider it to have been newly proposed by Hooker and Arnott, as has been done quite often, as a renaming in another genus of the Walter described species. Hooker and Arnott (1834) did cite Walter and it is clear that they had his description in mind. However, if the name were to date from their work, it would even then not take priority over Elliott's *Walteri*. Walter did not cite Linnaeus as the author of *Sisymbrium tanacetifolium* in his book but he did use a question mark after *tanacetifolium*. It is inconceivable that he would have questioned the application of a name he was himself proposing.

Rorippa Walteri occurs from South Carolina southward to Florida and westward, largely on the coastal plain, through Texas; on the eastern and western lowlands of Mexico and at least in Nicaragua in Central America. For the present study, I have not tried to determine the total geographic range of the species. It is possible that *R. Walteri* has been carried by man somewhat outside of its natural range in Mexico and Central America because it is used as a salad plant, and it may be seen in the local markets of western Mexico. As in most species of *Rorippa*, there is considerable variation in the leaf-pattern and habit of growth. These features are strongly influenced by the conditions of moisture and light under which the plants grow.

Vesicular trichomes, somewhat longer and more constricted toward the base than those in *Rorippa sinuata*, are found on plants of *R. Walteri*, especially on the lower portions of the stems. The abundance decreases upward, often resulting in glabrousness on the upper parts of the plant. This distribution of trichomes is characteristic of specimens from the Atlantic slope of Mexico to South Carolina but most of the material from the Pacific slope of Mexico shows a different trichome distribution. Specimens from Nayarit to Sonora, and the single specimen I have seen from Nicaragua, have glabrous stems but vesicular trichomes are pres-

ent on the siliques. Specimens from Colima and Oaxaca are similar to those of the eastern range of the species. There appears to be a trend toward shorter pedicels and more unevenly divided leaves in the western Mexican material. Furthermore, it seems that drier habitats are the rule in the western as compared to the eastern part of the range. All of these correlated characteristics, coupled with geographic segregation, suggest a divergent trend that may eventually result in separable taxa. At the present time, evidences of continuity throughout the species are found in a variety of structures and it seems wise to view the whole as a single species, although the addition of new knowledge might well require a revision in the direction of a recognition of a larger number of entities.

Rorippa Walteri is most easily recognized by the pinnately compound lower leaves with the leaflets at least dentate and often deeply lobed; the short (1-3 mm.) divaricate pedicels; minute flowers; terete, divaricately ascending siliques; prominent styles and the distinctive, somewhat clavate vesicular trichomes either on the stems or the siliques or occasionally on both. A selection of specimens is cited below to aid in interpreting this species.

UNITED STATES. **South Carolina:** Beaufort, *J. R. Churchill 432* (GH); St. Johns, Berkeley, *H. W. Ravenel s. n.* (GH), **Florida:** 4 miles n. Crawfordville, Wakulla Co., *Godfrey and Almodovar 52975* (GH); dried bottom of Lake Jackson, Leon Co., *Hunnewell 13048* (GH); near Jacksonville, Duval Co., *A. H. Curtiss 4589* (GH). **Mississippi:** 3 miles from Laurel, Jones Co., *Cooley and Pease 3104* (GH); near Natchez, *Sullivant s. n.* (GH). **Louisiana:** New Orleans, *T. Drummond 18* (GH). **Oklahoma:** Sapulpa, *B. F. Bush 1233* (GH). **Texas:** Conquista Crossing, between Falls City and Deweesville, Karnes Co., *Johnston 1462* (GH); Corpus Christi, Nueces Co., *Heller 1487* (GH); Bastrop, Bastrop Co., *E. J. Palmer 33381* (GH); Santa Elena Canyon, Brewster Co., *Goodman and Waterfall 4653* (GH). MEXICO. **Tamaulipas:** near Matamoros, April, 1831, *Berlandier 879* (GH). **Vera Cruz:** Jalapa, *Pringle 8087* (GH, US); Cordoba, *Orcutt 3134* (GH, US). **Sonora:** vicinity of Alamos, *Rose, Standley and Russell 13012* (GH, US); vicinity of Culiacán, *Rose, Standley and Russell 14974* (GH, US); 12 miles west of Culiacán, *Gentry 7004* (GH). **Nayarit:** vicinity of Acaponeta, *Rose, Standley and Russell 14246* (US). **Colima:** Manzanillo, *Palmer 1344* (GH). NICARAGUA. **Zelaya:** Rio Grande, *Antonio Molina R. 2172* (US).

Rorippa portoricensis (Sprengel) Stehlé, Rev. Bot. Appliq. **26**: 103. 1946.

This name is based on *Nasturtium portoricensis* Sprengel (1825), which appears to have been described from the same Bertero collection cited from Puerto Rico as that used by De Candolle (1821) as the basis for *Nasturtium palustre* var. *brevipes*. De Candolle's var. *brevipes* was first raised to specific rank by Grisebach in 1860 and the name *Nasturtium brevipes* (DC.) Griseb. was used by Schulz in various papers on the Cruciferae of the West Indies. However, the oldest and the correct specific name appears to be *portoricensis*.

The relationship of *R. portoricensis* to *R. Walteri* is a very close one and there is some question as to whether an interpretation of the existing evidence as indicating a single species, probably with the recognition of a West Indian variety, is not more realistic than the acceptance of two species. Watson, in the Synoptical Flora of North America (1895), did treat the West Indian material as *Nasturtium tanacetifolium* var. *insularum*. At that time, *N. tanacetifolium* was in common use for the species now known as *Rorippa Walteri*. However, a broader and more detailed study of the genus *Rorippa* than is at present possible is much needed, and should be looked to for the settling of many such difficult questions of taxonomic interpretation as that posed by *R. portoricensis*.

Assuming for the present that *R. portoricensis* is a good species, the material I have seen shows it to be present in Cuba, the Dominican Republic and Puerto Rico. The principal differences from *R. Walteri* are shown by the siliques, which are shorter with a nearly sessile stigma instead of a definite style, and the shorter, more ascending pedicels. Vesicular trichomes similar to those of *R. Walteri* are present on the lower stems and usually the valve-margins of the Cuban specimens and at least along the valve-margins of the siliques (only occasionally on the lower stems) of the material from the Dominican Republic and Puerto Rico. These are the same two trichome distribution patterns found in *R. Walteri*. The following specimens have been determined as *R. portoricensis* in the present study.

CUBA. *F. Rugel 235* (GH); **Pinar del Rio:** Galafre, *Britton and Cowell 9826* (GH); Las Guaaimas, *O'Donovan 4687* (GH); Santa Catarine, *C. Wright*, Feb. 1860 (GH); "in Cuba Orientali". *C. Wright 1562* (GH). DOMINICAN REPUBLIC: Pontezuela, *Jiménez 2565* (US); Constanza, *Türckheim 4031* (GH, US); La Estancia, *Ekman 12124* (A, US); La Cumbre, *Raunkier 1084* (US). PUERTO RICO: Cabo-Rojo, *Sintenis 699* (GH); Adjuntas, *Sintenis 4033* (US); Añasco, *Sintenis 5625* (GH). — GRAY HERBARIUM OF HARVARD UNIVERSITY.

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A RE-EVALUATION OF THE GENERIC STATUS OF ASCYRUM AND CROOKEA (GUTTIFERAE)

WILLIAM P. ADAMS AND NORMAN K. B. ROBSON

Recent intensive studies of the floral anatomy and taxonomy of *Hypericum* and the segregates *Ascyrum* and *Crookea* have led to a re-evaluation of the generic status of these groups. A general review and study of the floral anatomy of *Hypericum* and related genera by Robson (1956) indicates that the species belonging to *Ascyrum*, *Crookea* and the sections *Myriandra* and *Brathydium* of *Hypericum* are closely related to each other. Recent studies by Adams (1959) in the taxonomy of these species appear to confirm Robson's idea that they form a very natural group. In the following discussion we will present evidence supporting the

reduction of the genera *Ascyrum* and *Crookea* to the more inclusive genus *Hypericum*.

Financial support of the senior author's studies in the taxonomy of *Hypericum* was provided by the following sources: the Fernald Fund for Study in Systematic Botany at Harvard University, established by Mr. F. W. Hunnewell of Wellesley, Massachusetts; a National Institute of Health grant-in-aid through the Department of Biology, Harvard University; and a research grant (RG-6305) to Dr. R. K. Godfrey of Florida State University from the Division of General Medical Studies, Public Health Service.

Ascyrum L., Gen. Pl. ed. 5. 342. 1754. Since it was first described by Linnaeus the genus *Ascyrum* has included those species having a tetramerous calyx and corolla, with two unequal pairs of sepals. The large genus *Hypericum* has long included those species with pentamerous corolla and calyx. Apparently the first author to challenge this classification was Crantz (1766) who transferred the *Ascyrum* species to the larger genus. Later authors, however, maintained *Ascyrum* as a distinct genus. During the past sixty years several taxonomists have questioned this segregation but, with the exception of Keller (1895), no one has attempted to revise the traditional classification. Coulter, in his treatment of the *Hypericaceae* for the *Synoptical Flora of North America* (1897), stated: "The propriety of a generic separation from *Hypericum* is very doubtful." In 1895 Keller treated *Ascyrum* as a section of *Hypericum*. Thirty years later, however, Keller (1925) reconsidered the problem and gave *Ascyrum* generic status but apparently with some misgivings for he remarked: "Die Gattung ist jedenfalls nur künstlich von *Hypericum* zu trennen." Recently, in a revision of the *Ascyrum* species by Adams (1957), the question was briefly discussed but it was decided to treat the species as members of *Ascyrum* until the closely related species of *Crookea* and *Hypericum* § *Myriandra* could be studied.

EVIDENCE FOR A MERGER OF ASCYRUM WITH HYPERICUM

THE FLOWER. The tetramerous calyx and corolla, characters which have been traditionally used to distinguish *Ascyrum* as a genus, occur not infrequently in many *Hypericum* species. In § *Myriandra*, 4-parted flowers have been observed in *H. ellipticum* Hook., *H. myrtifolium* Lam. and *H. galioides* Lam. and doubtless occur occasionally in other species. According to Milne-Redhead (1953), 4 sepals and

petals may sometimes be found in the African *H. kiboense* Oliv. (§ *Humifusoideum*). Tetramery appears to be the normal condition in *H. filicaule* Dyer ex Hook. f. a species of *Hypericum* from the Sikkim Himalaya which Dyer considered to belong to *Ascyrum*. Robson (1956), however, showed it to be closely related to other Himalayan species in that section.

Flowers with pentamerous corollas, a characteristic which has been long used to separate *Hypericum* from *Ascyrum*, occur in *Ascyrum pumilum* Michx. Pentasepalous flowers have not yet been observed in *Ascyrum* although they occur not infrequently in *Crookea* (see below).

The genus *Ascyrum* has been further characterized by the presence of two unequal pairs of sepals. This condition is not uncommon in many species of *Hypericum* in which the sepals are unequal because of their quincuncial development. The first (or exterior) two are almost opposite and more or less equal, the third (with one margin exterior and the other interior) is smaller, and the fourth and fifth sepals (or interior ones) are smaller still and nearly equal in size and shape. Unequal sepals are characteristic of *H. macrosepalum* Rehder, *H. humifusum* L., *H. androsaemum* L., *H. filicaule*, and several species in *Hypericum* § *Myriandra*.

Floral characteristics common to *Ascyrum* and certain species of *Hypericum* include: persistent sepals and stamens; short to long styles; minute stigmas; lack of sepal articulation; petals which are yellow, convolute in the bud and usually quickly deciduous; numerous afascicular stamens; versatile anthers which dehisce laterally by longitudinal slits; 3 or 2 carpels; parietal placentation; dry, septicidal capsule; numerous small seeds; and an inflorescence which is obviously reduced to a single flower from a simple, 3-parted dichasium.

ANATOMY OF THE FLOWER. Except for tetramery, the anatomy of the flower in *Ascyrum* is very similar to that found in various species of *Hypericum* § *Myriandra*. The inner (smaller) sepals have unilacunar (not trilacunar) traces, but this is a common effect of reduction in the width of insertion of a foliage member (Robson, 1956).

VEGETATIVE BODY. In growth habit the species of *Ascyrum* are not unlike various members of *Hypericum* § *Myriandra*. The low, bushy, suffruticose form of *A. pumilum* Michx. and *A. multicaule* Michx. is paralleled by that of *H. buckleyi* S. Wats. The erect, shrubby nature of *A. stans* Michx. and *A. tetrapetalum* (Lam.) Vail is very similar to that of *H. cistifolium* Lam. and *H. myrtifolium* Lam.

Winged stems are present in *Ascyrum* species and occur in practically all sections of the genus *Hypericum*.

In *Ascyrum*, as well as in § *Myriandra* of *Hypericum*, the secretory structures in the leaves, sepals and stems are composed of translucent or pellucid-punctate glands which take the form of dots or vittae (elongate tube-like sacs). The black punctate glands which are typical of such herbaceous species as *H. punctatum* Lam. and *H. perforatum* L. are absent from these groups, however.

The leaves (as well as the sepals) of *Ascyrum* do not have a basal groove or articulation, a feature lacking in its closest relatives among the species of *Hypericum* § *Myriandra* as well. The leaf margin in *Ascyrum* is narrowed abruptly into a thin hyaline zone which is easily seen in living plants but becomes obscure in dried material. This characteristic is also present in several species of *Hypericum* § *Myriandra*.

ANATOMY OF THE STEM. A comparative study of the stem anatomy by Vestal (1937) showed that *Ascyrum* species differ very little, if any, from the woody members of the genus *Hypericum*. Furthermore, Vestal found "a very constant homogeneity" with "no segregation of anatomical groups possible" among the one hundred or more species of *Hypericum* which he studied.

CHROMOSOMES. The haploid number of nine is present in five of the six species of *Ascyrum* for which counts have been made (Adams, 1959). The same haploid number is present in at least eighteen members of *Hypericum* § *Myriandra* (Hoar and Haertl, 1932; Adams, 1959). It has been found also in several species of sections *Hypericum*, and *Triadenioideae*. In size and shape the meiotic chromosomes of *Ascyrum* and of § *Myriandra* are remarkably similar. No detailed karyotype analysis has been attempted on these

species, however.

GEOGRAPHIC DISTRIBUTION. *Ascyrum* and its closest relatives in *Hypericum* § *Myriandra* are native only in eastern North America, especially the southeastern portion. Moreover, the other members of the section occur only in the same region.

Crookea Small, Fl. Southeastern U.S. 786, 1335. 1903. The single species comprising the genus *Crookea* was first described by Torrey and Gray (1838) as *Ascyrum microsepalum*. That it occupied an anomalous position in this genus was suggested by their remark: "This species differs from all the others of the genus in the somewhat equal and very small sepals; as well as in the long style: it has the habit of Hypericum." Many years later Sereno Watson (1878) transferred it to *Hypericum*. Coulter (1897) agreed with Watson, noting that this species showed very close affinity with *Hypericum* in all characteristics except, of course, the tetramerous flowers. In order better to accommodate this rather anomalous species, Small (1903) distinguished the monotypic genus *Crookea*. Later Keller (1925) treated it again as an *Ascyrum*. Recent studies (see below) suggest that both *Crookea* and *Ascyrum* are very closely related to § *Myriandra* of *Hypericum*.

EVIDENCE FOR A MERGER OF CROOKEA WITH HYPERICUM

THE FLOWER. The flowers of *Crookea* are like *Ascyrum* in being tetramerous, but the nearly equal size and shape of its two pairs of sepals are definitely suggestive of *Hypericum*.

Sepal and petal number in *Crookea* are very variable even in flowers on a single plant. Many individual plants may have only 4-parted flowers. Not infrequently, however, plants are found which have typical hypericaceous pentamerous flowers. The same plants may possess flowers which are "intermediate" in sepal and petal number, size, and shape. As regards the total number of perianth parts, flowers with 4 sepals and 5 petals, or 5 sepals and 5 petals have been observed. The sepals and petals of a single flower may differ in size and shape and one or more may be much smaller than the others; not infrequently, two petals or two sepals

may be partially fused, presenting a doubled appearance. A detailed analysis of the flower variation in *Crookea* will be presented by the senior author in a forthcoming taxonomic study of its single species and its relatives in *Hypericum* § *Myriandra*.

All the other floral and vegetative morphological characteristics of *Crookea* occur as well in various *Hypericum* species. These include its low, bushy growth habit, winged stems, translucent secretory glands, numerous small seeds, absence of leaf and sepal articulation, rounded leaf margins, parietal placentation, and a haploid chromosome number of nine.

SUMMARY

To recognize *Crookea*, *Ascyrum* and *Hypericum* as distinct genera appears to us to require the use of rather arbitrary criteria as a means of delimiting these genera. An analysis of the constellation of morphological characteristics common to the species of *Crookea*, *Ascyrum* and certain species of *Hypericum* which suggest close genetic affinity indicates that they should be included in a single genus of which *Crookea* and *Ascyrum* represent extreme evolutionary developments.

The reduction of the genera *Crookea* and *Ascyrum* to *Hypericum* makes necessary the following nomenclatural changes:

Hypericum edisonianum (Small) Adams and Robson, comb. nov. Based on *Ascyrum edisonianum* Small, Man. Southeastern Fl. 868. 1933 [as *Edisonianum*].

Hypericum hypericoides (L.) Crantz, Institut. rei herbariae. 2:520. 1766. *Ascyrum Hypericoides* L., Sp. Pl. 2:788. 1753.

Hypericum mierosepalum (T. & G.) Gray ex S. Wats., Biblio. index to N. Am. botany. 1:456. 1878. *Ascyrum microsepalum* T. & G., Fl. N. Am. 1:157. *Crookea microsepala* (T. & G.) Small, Fl. Southeastern U. S. 786, 1335. 1903.

Hypericum suffructicosum Adams and Robson, nom. nov. Based on *Ascyrum pumilum* Michx., Fl. Bor.-Am. 2:77. 1803. *Non Hypericum pumilum* Sesse & Moc., Fl. Mexic. ed. 2:177. 1894 [as *pumillum*].

Hypericum stans (Michx.) Adams and Robson, comb. nov. Based on *Ascyrum stans* Michx., Fl. Bor.-Am. 2:77. 1803.

Hypericum stragulum Adams and Robson, nom. nov. Based on *Ascyrum multicaule* Michx., Fl. Bor.-Am. 2:77. 1803. *Non Hypericum multicaule* Lam., Encyc. 4:178. 1797. *Ascyrum spathulatum* Spach, Hist. Nat. Vég. 5:462. 1836. *Non Hypericum spathulatum* (Spach) Steud., Nomencl. ed 2, 1:789. 1840, which was based on *Myriandra spathulata*.

Hypericum tetrapetalum Lam., Encyc. 4:153, 1797. *Ascyrum tetrapetalum* (Lam.) Vail in Small, Fl. Southeastern U. S. 785, 1903.

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CHROMOSOME NUMBERS OF SOME BRAZILIAN LEGUMINOSAE[1]

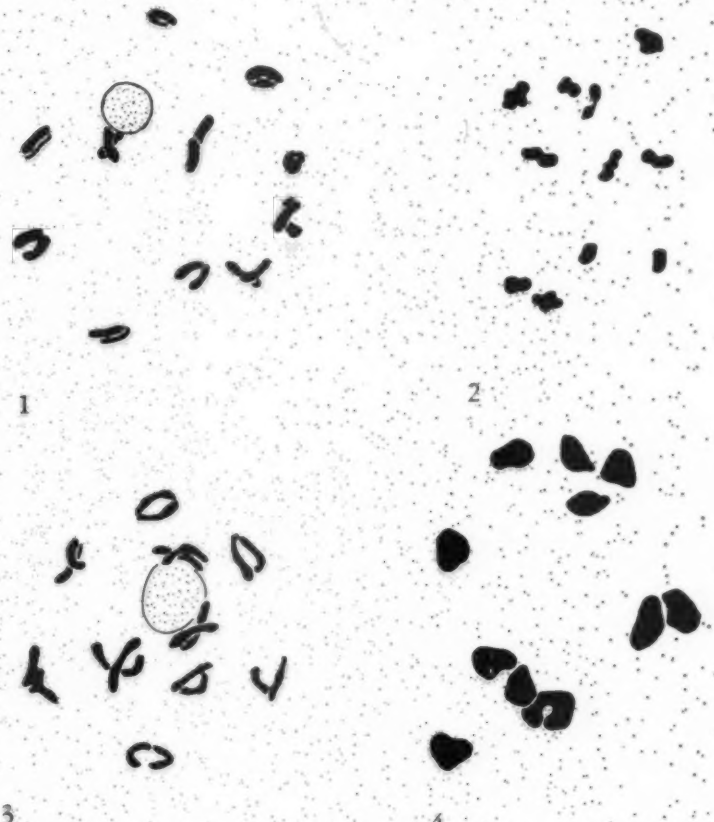
B. L. TURNER AND H. S. IRWIN

The junior author of this paper spent 5 months during 1958-59 in south-central Brazil collecting *Cassia* material in connection with a doctoral thesis problem. Since he was routinely collecting bud material of various species of this genus and shipping these air mail to the senior author for meiotic examination, he was able to include, as time and opportunity permitted, occasional bud collections of other

[1]This study was supported in part from funds provided by The University Research Institute of The University of Texas. We are indebted to Dr. Richard S. Cowan of the Smithsonian Institution for the identification of the specimens.

taxa of the family Leguminosae. The present contribution summarizes the results of a study of this latter material.

Chromosome counts were made by the squash technique essentially as outlined by Turner (1956). Voucher specimens are deposited at The University of Texas Herbarium, the United States National Herbarium and elsewhere.



FIGURES 1-4. Camera lucida drawings of meiotic figures. FIG. 1. *Camptosema tomentosum* ($n = 11$). FIG. 2. *Centrosema coriaceum* ($n = 11$). FIG. 3. *'Galactia' martii* ($n = 10$). FIG. 4. *Periandra mediterranea* var. *mucronata* ($n = 11$). All figures x ca. 2000.

TABLE 1. SPECIES OF BRAZILIAN LEGUMINOSAE EXAMINED FOR CHROMOSOME NUMBERS.

Species	Voucher collection	n number
CAESALPINIOIDEAE		
Bauhinia aff. *mollis* (Bong.) Walp.	GOIAS: *Irwin 2584.*	$n = 14$
Bauhinia rufa Steud.	MINAS GERAIS: *Irwin 2395.*	$n = 14$
Caesalpinia ferrea Mart.	MINAS GERAIS: *Irwin 2368.*	$n = 12$
Caesalpinia spinosa (Molina) Ktze.	MINAS GERAIS: *Irwin 2329.*	$n = 12$
Caesalpinia sp.	MINAS GERAIS: *Irwin 2331.*	$n = 12$
Copaifera langsdorffii Desf.	MINAS GERAIS: *Irwin 2394.*	$n = 12$
PAPILIONOIDEAE		
Aeschynomene elegans S. & C.	MINAS GERAIS: *Irwin 2081.*	$n = 10$
Camptosema tomentosum Benth.	MINAS GERAIS: *Irwin 2481.*	$n = 11$ (Fig. 1)
Centrosema coriaceum Benth.	MINAS GERAIS: *Irwin 2503.*	$n = 11$
Centrosema coriaceum Benth.	MINAS GERAIS: *Irwin 2366.*	$n = 11$ (Fig. 2)
Crotalaria stipularia Desv.	MINAS GERAIS: *Irwin 2006.*	$n = 16$
Crotalaria striata Schrank	MINAS GERAIS: *Irwin 2018.*	$2n = 16$
Crotalaria sp.	MINAS GERAIS: *Irwin 2463.*	$n = 8$
Galactia martii DC.	MINAS GERAIS: *Irwin 2406.*	$n = 10$ (Fig. 3)
Galactia martii DC.	MINAS GERAIS: *Irwin 2506.*	$n = 10$
Indigofera cf. *truxillensis* H.B.K.	MINAS GERAIS: *Irwin 2176.*	$n = 8$
Periandra mediterranea (Vell.) Taub.	MINAS GERAIS: *Irwin 2504.*	$n = 11$
Periandra mediterranea var. *mucronata* (Benth.) Burk.	MINAS GERAIS: *Irwin 2393.*	$n = 11$ (Fig. 4)

CAESALPINIOIDEAE — Chromosome counts for species in the genus *Bauhinia* ($n = 14$) and *Caesalpinia* ($n = 12$) are consistent with reports for other species in these taxa (Darlington and Wylie, 1956). Including the present (Table 1), only 3 species of *Copaifera* have counts reported for them, 2 from South America and one from Africa (Mangenot and Mangenot, 1957). All were diploid with $n = 12$.

PAPILIONOIDEAE — Chromosome counts for species of *Aeschynomene* ($n = 10$), *Crotalaria* ($n = 8$), *Galactia* ($n = 10$) and *Indigofera* ($n = 8$) are consistent with the basic numbers already established for these genera. The chromosome number of *Centrosema coriaceum* ($n = 11$; fig. 2) dif-

fers from that of the other three species of the genus reported. All of the latter are diploid with $n = 10$ (Frahm-Leliveld, 1957).

Chromosome counts for taxa of *Camptosema* ($n = 11$) and *Periandra* ($n = 11$) are first reports for these genera.

SUMMARY

Chromosome counts for 17 taxa of Brazilian Leguminosae are reported, these include first reports for 15 species and two genera (*Periandra*, $x = 11$, and *Camptosema*, $x = 11$). *Centrosema coriaceum* ($n = 11$) was found to have a different basic number than has been previously reported for the genus. — BOTANY DEPARTMENT AND THE PLANT RESEARCH INSTITUTE, UNIVERSITY OF TEXAS, AUSTIN.

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A DECADE OF BOTANIZING IN ILLINOIS

ROBERT H. MOHLENBROCK

The publication of Flora of Illinois, Second Edition (Jones, 1950) brought up to date the vascular plants known to occur in the state and at the same time fortunately paved the way for intensive botanizing throughout the state. As documentation for this renewed research on the Illinois flora, no less than eighty publications have appeared since 1950, many of them recording species previously unreported from Illinois. Efforts have been concentrated throughout the state — in the Chicago region by Steyermark, Swink, and Thieret, in the northwestern section by E. W. Fell, in the east central area by Jones and Ahles, in the west central section by V. Chase, Dobbs, Rexroat, and Winterringer, and in southern Illinois by Voigt and the writer. In addition, Evers has collected extensively throughout the state.

Flora of Illinois (l.c.) enumerated 730 genera and 2202 species. In the subsequent decade, 71 genera and 350 species have been added, representing a thirteen per cent increase in the species total. Of these, 64 are species which are considered native to Illinois. It is these latter that are considered the most significant new finds to Illinois, since they denote natural range extensions. The area of greatest concentration of these newly found Illinois plants is across the extreme southern portion of Illinois, in or near the vicinity of the Shawnee Hills. Fifty-three of the 64 are known from 10 extreme southern counties.

Several of the species fill in previously existing gaps in the distribution, while others mark extensions in the ranges. These are enumerated below according to their distribution.

In addition, two endemics have been described from Illinois since 1950. These are *Aster chasei* G. N. Jones from Marshall, Peoria, and Tazewell counties and *Cyperus grayioides* Mohlenbrock from Mason and Whiteside counties.

NATIVE SPECIES FILLING IN GAPS IN DISTRIBUTION

Asplenium bradleyi	*Carex debilis*	*Vitis lincecumii*
Glyceria pallida	*Lemna valdiviana*	*Penstemon alluviorum*
Carex austrina	*Juncus diffusissimus*	*Dicliptera brachiata*
Carex atherodes	*Juncus secundus*	*Ruellia carolinensis*
Carex caroliniana	*Polygonatum biflorum*	*Eupatorium fistulosum*
Carex digitalis	*Smilax herbacea*	*Rudbeckia bicolor*
Carex swanii	*Pilea fontana*	*Solidago buckleyi*
Carex torta	*Draba cuneifolia*	*Solidago rugosa*
Carex texensis	*Rubus alumnus*	

NATIVE SPECIES EXTENDING RANGE TO THE NORTH

Scirpus kalolepis	*Aristolochia nashii*	*Heliotropium tenellum*
Carex oxylepis	*Crataegus collina*	*Gerardia fasciculata*
Carex physorhyncha	*Prunus mexicana*	*Galium virgatum*
Allium mutabile	*Hypericum tobocarpum*	

NATIVE SPECIES EXTENDING RANGE TO THE NORTHWEST

Carex decomposita	*Arisaema pusilla*	*Tipularia discolor*
Carex striatula	*Wolffiella floridana*	*Gaura filipes*
Carex styloflexa	*Trillium cuneatum*	*Solidago boottii*

NATIVE SPECIES EXTENDING RANGE TO THE NORTHEAST

Isoetes butleri	*Jussiaea leptocarpa*	*Solidago strigosa*
Ranunculus harveyi	*Penstemon arkansanus*	

NATIVE SPECIES EXTENDING RANGE TO THE EAST

Talinum calycinum
Viola viarum
Vernonia crinita

NATIVE SPECIES EXTENDING RANGE TO THE SOUTHEAST

Pilea opaca

NATIVE SPECIES EXTENDING RANGE TO THE SOUTHWEST

Lycopodium flabelliforme
Carex emmonsii
Trillium erectum
Solidago uliginosa

NATIVE SPECIES EXTENDING RANGE TO THE WEST

Rubus enslenii

NATIVE SPECIES SHOWING DISJUNCT DISTRIBUTIONS

Bromus nottowayanus
Lipocarpha maculata
Scleria reticularis
Cimicifuga cordifolia

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NEW COMBINATIONS IN GRASSES[1]

JULIAN A. STEYERMARK AND C. L. KUCERA

During the course of study of the grass flora of Missouri, the authors have found it necessary to change the categories of several taxa, resulting in the following new combinations:

Glyceria septentrionalis Hitchc. var. **arkansana** (Fern.) Steyerm. & Kucera, comb. nov., based on *Glyceria arkansana* Fern., Rhodora 31: 49. 1929.

[1]Work on this paper was completed during the period when the senior author received grants-in-aid (G 5623, 7117) from the National Science Foundation.

Muhlenbergia Schreberi Gmel. var. **curtisetosa** (Scribn.) Steyerm. & Kucera, comb. nov., based on *M. Schreberi curtisetosa* Scribn., Rhodora 9: 17. 1907 (as subspecies); *M. curtisetosa* (Scribn.) Bush, Am. Midl. Nat. 6:35. 1919.

As suggested by Gleason (New Ill. Fl. 1: 174. 1952), *M. curtisetosa* appears to be of doubtful taxonomic status as a species, and seems better regarded as a variety of *M. Schreberi*, which it closely resembles in general appearance.

Sporobolus clandestinus (Bieler) Hitchc. var. **canovirens** (Nash) Steyerm. & Kucera, comb. nov., based on *Sporobolus canovirens* Nash, in Britton, Man. 1042. 1901; *S. asper* var. *canovirens* (Nash) Shinners, Rhodora 56: 30. 1954.

There is intergradation in spikelet length, relative length of palea and lemma, and degree of prolongation of the palea between *S. clandestinus* and *S. canovirens*. In the extremes of their variation, the two taxa appear quite distinct, but the frequent occurrence of transitional specimens which are difficult to place would indicate the reduction to varietal rank. Since both *S. clandestinus* var. *clandestinus* and var. *canovirens* possess pubescent lemmas, it is believed that this character warrants their being treated as varieties of *S. clandestinus*, rather than merged, as Shinners has done, as varieties of *S. asper*, which possesses glabrous lemmas.

Sporobolus neglectus Nash var. **ozarkanus** (Fern.) Steyerm. & Kucera, comb. nov., based on *Sporobolus ozarkanus* Fern., Rhodora 35: 109. 1933; *S. vaginiflorus* var. *ozarkanus* (Fern.) Shinners, Rhodora 56: 29. 1954.

The glabrous and short, pointed lemmas, together with the relatively less elongated apex of the palea apparently relate *S. ozarkanus* more closely to *S. neglectus* than to *S. vaginiflorus*. The relatively longer spikelets of *S. ozarkanus*, together with the strongly ciliate orifices of the leaf-sheaths, are points of resemblance between *S. ozarkanus* and *S. vaginiflorus*, but occasional specimens of *S. neglectus* var. *neglectus* also exhibit ciliate orifices. The strongly ciliate orifices of the leaf-sheaths, believed by Fernald to be characteristic of *S. ozarkanus*, cannot be considered a distinguishing feature of that taxon.

Leptochloa filiformis (Lam.) Beauv. var. **attenuata** (Nutt.) Steyerm. & Kucera, comb. nov. based on *Oxydenia attenuata* Nutt. Gen. Pl. 1: 76. 1818; *Leptochloa attenuata* (Nutt.) Steud., Syn. Pl. Glum. 1: 209. 1854.

In their extremes, *Leptochloa filiformis* and *L. attenuata* appear to be distinct. However, many intergradations are found among specimens in Missouri with both types sometimes appearing together. In general, *L. filiformis* var. *filiformis* is taller, attaining 1.2 m. in height, and the inflorescence is often larger with 20-100 stiff spikes, while *L. filiformis* var. *attenuata* is usually of shorter stature, and the inflorescence is usually smaller with only 10-30 flexuous spikes. Unfortunately, tall-growing plants, characteristic of *L. filiformis* var. *filiformis*, are found with the aristate glumes and smaller lemmas characteristic of *L. filiformis* var. *attenuata*, while low-growing plants, characteristic of *L. filiformis* var. *attenuata*, occur with the acute glumes and larger lemmas characteristic of *L. filiformis* var. *filiformis*. The same lack of correlation is noted occasionally between the greater or lesser length of the glumes with respect to the upper floret and the height of the plant. Deam (Grasses of Indiana, p. 198. 1929) also had difficulty in determining whether a specimen placed by him in *Leptochloa attenuata* should warrant specific or varietal status. — INSTITUTO BOTANICO DEL MINISTERIO DE AGRICULTURA Y CRIA, CARACAS, VENEZUELA, AND UNIVERSITY OF MISSOURI, COLUMBIA, MISSOURI.

RHODODENDRON MAXIMUM IN HOPKINTON AND HARRISVILLE, NEW HAMPSHIRE

A. R. Hodgdon and Radcliffe Pike[1]

It becomes apparent that some of the many early reports by non-botanists of Rhododendron colonies in New Hampshire may be accurate, the occurrence in Hopkinton being a case in point. In 1874, C. S. Hitchcock stated that *Rhododendron maximum* grew in that township. On page 543 of volume I of his "Geology of New Hampshire" he made

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the following comment as part of a general discussion of the few and scattered colonies of the species in the State, "— I have got traces of it in Hopkinton and Hooksett." It is certain from Hitchcock's other comments that he knew the plant well. But it is by no means clear that he had more than verbal assurance that it grew wild in these two townships; nor does he state who his informants were. We have been inclined to rule out of consideration all such reports because in our own experience we have found that most of the general public in Maine and New Hampshire do not know *R. maximum*. In this instance however, the report of a station in Hopkinton proves to be authentic.

Early in March 1959, Mr. Henry Mock, a senior at the University of New Hampshire and a resident of Contoocook brought us a specimen from a small wild colony which he stated grew on the farm of a Mr. Frank Kimball in Hopkinton. On June 2 we were shown the colony by Mr. Mock and Mr. Kimball. The stand is particularly vigorous and luxuriant with rather uniform stems some of the tallest of which were 12 or more feet high. There were few flower-buds for the current season and there were no seedlings nor small plants in the area, in this respect differing markedly from most of the other stands in both Maine and New Hampshire where seedlings and young plants are often numerous. The colony is rectangular in shape and is about 50 feet wide by 150 feet long. The regular shape of the colony, the uniform growth and the absence of young plants made it seem planted rather than wild. However, Mr. Kimball convinced us that the colony was quite natural. He recalled his father Herbert Kimball, who was born about 1862, stating that in his youth, the colony was vigorous, but that somewhat later (about 65 years ago according to Frank Kimball), the bigger protecting trees were cut off for lumber, after which the Rhododendrons declined seriously. In recent years with the growth of suitable species of shading and protecting trees in the vicinity of the stand it has made a remarkable recovery.

The Harrisville Rhododendrons to our knowledge have not been reported previously. Mr. Tudor Richards of Dublin

first learned of this colony from local residents a few months ago and made arrangement with Mr. Merle Jones of Hancock who guided Mr. Richards and the senior author to the station on June 9, 1960. This part of Harrisville and adjacent Hancock is heavily wooded with considerable swampland and intervening rocky upland. The colony is very close to the Hancock line and is about three quarters of a mile east of Skatutakee Lake.

Rhododendron plants are found over a total area of about one half acre. A dense growth of middle-sized to large shrubs occupies the wetter places while an equal quarter acre of drier footing on the eastern side has some isolated large plants as well as some scattered small individuals which must have started as seedlings in recent years. While a few plants are close to 10 feet in height, most of them fall short of this. It is evident that the plants comprising this colony have not yet attained their full growth: at least in other colonies that we have studied the biggest plants have nearly always been considerably taller than those in Harrisville. Here the older plants of earlier times presumably have been replaced by seedlings or rejuvenated sprout growth. This is a colony that undoubtedly will be improving during the next few years.

This makes a total of 11 townships in which we have observed wild stands of Rhododendron in New Hampshire. These are Albany, Pittsfield, Barnstead, Hopkinton, Grantham, Manchester, Mason, Wilton, Fitzwilliam, Harrisville and Richmond. Are there still other stations in New Hampshire? In "The History of Weare" by William Little published in 1888 there is mention of the occurence of both Mountain laurel and Rhododendron in the township. Leander W. Cogswell in 1880 in his "History of the Town of Henniker" states that "rhododendron or river laurel adorns banks of Contoocook" which might refer to *Kalmia latifolia*. We have been told of a colony near the eastern end of Squam Lake probably in Sandwich. Thus there may be other stations but it seems to us that we have now a fairly complete list of Rhododendron colonies in New Hampshire. Several years of diligent sleuthing on our part have resulted in dis-

closing only one New Hampshire station (Harrisville) that had not been reported in some published work. And this stand was well enough known locally to be a topic of conversation at a party. — DEPARTMENT OF BOTANY AND DEPARTMENT OF HORTICULTURE, UNIVERSITY OF NEW HAMPSHIRE, DURHAM, NEW HAMPSHIRE.

CAMPANULAR PERSISTENCE. — While walking on the railroad in Randolph, N. H., near the former station of Appalachia, in the summer of 1920, I observed, on a gravelly embankment, one good-sized clump, about six inches in diameter and the same in height, of a many-stemmed *Campanula*, with small pale blue flowers on naked flexuous peduncles. Leaving most of the plant undisturbed, I placed a portion in the herbarium of the New England Botanical Club *(Pease 18093)*, and by analysis and comparison with specimens in the Gray Herbarium identified the plant as *Campanula divaricata* Michx., which is now described in the eighth edition of Gray's *Manual* as growing "in dry woods and rocky slopes, w. Md., W. Va. and Ky., s. to. Ga. and Ala." In my *Vascular Flora of Coös County, N. H.* (1924), p. 345, I have reported the plant as rarely adventive and persistent in 1923.

Over the years from 1923 to the present I have watched the fate of this little pilgrim, and several years ago, when the railroad track was heavily reballasted with unpromising gravel, found its site deeply buried. For several years I considered it as gone beyond recovery, but then it rose again from the gravel, and my annual visits recommenced. Then came another calamity; some four or five years ago the track was again reballasted, this time with even more unpromising cinders, and I had again to mourn the loss of the *Campanula*. This summer (1960) it occurred to me to look again, and lo! there again it was at its accustomed place, rising through cinders as it had previously through gravel.

Forty years, then, at least — for I do not know how long before 1920 it was first established here — this delicate little plant has survived an austere diet and violent attacks upon its security. It shows no disposition to increase, but whether

this may be due to a lack of the insects needed to fertilize it or to other causes I know not.

Mr. Walter Deane reported to the Botanical Club (RHODORA 4:243-244; 10:203-204) on the persistence of *Cephalanthus occidentalis* L. for 43 years in a pig-sty at Shelburne, N. H.; equally or perhaps even more notable is the experience of this delicate little wild-flower, about eight feet from a heavily ballasted railroad track and at least five hundred miles from its natural home. — ARTHUR STANLEY PEASE, RANDOLPH, N. H.

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